SEMESTER END EXAMINATION, MAY 2024

Course Name: - B. Tech
Paper Name: - NEURAL NETWORKS & DEEP LEARNING

Semester: - 6th
Paper Code: - TCS 604

Time - 3Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. Max Marks-70

समय – 3 घण्टे 20 मिनट प्रति घंटे अतिरिक्त–दृष्टिबाधित एवं सहलेखक परीक्षार्थियों के लिए। अधिकतम अंक–70

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries **03** marks. All questions are compulsory.
- Section B- Answer any **5 out of 7** given questions in maximum hundred **(150) words**. Each question carries **7 marks**.
- Section C- Answer any **2 out of 3** given questions in maximum one hundred fifty **(500) words**. Each question carries **10 marks**.

निर्देश:

- प्रश्न पत्र में तीन खण्ड अ, ब, व स हैं। सभी खण्ड अनिवार्य हैं।
- खण्ड–अ में प्रत्येक प्रश्न 3 अंक का है। सभी प्रश्न अनिवार्य हैं।
- खण्ड–ब में 7 प्रश्नों में से किन्हीं 5 प्रश्नों के उत्तर अधिकतम पचास (150) शब्दों में दें। प्रत्येक प्रश्न 7 अंक का है।
- खण्ड–स में 3 प्रश्नों में से किसी 2 प्रश्न के उत्तर अधिकतम एक सौ प्चास (500) शब्दों में दें। प्रत्येक प्रश्न 10 अंक का है।

Section – A खण्ड–अ

Objective Questions (वस्तुनिष्ठप्रश्न)

1. Answer all the following questions. **5×3=15**

निम्नलिखित सभी प्रश्न अनिवार्य हैं।

(i) What is the primary purpose of an activation function in a neural network?
A. To add noise to the input data
B. To map the input to a binary output
C. To introduce non-linearity into the model
D. To optimize the loss function

(ii) Which of the following is an example of a feed forward neural network?
A. Convolutional Neural Network
B. Hopfield Network
C. Boltzmann Machine
D. Recurrent Neural Network

(iii) In which type of neural network is back propagation commonly used?
A. Probabilistic Neural Network
B. Feed Forward Neural Network
C. Hopfield Network
D. Boltzmann Machine

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(iv) Which deep learning tool is known for its efficiency in computer vision tasks?

A. Theano
B. Torch
C. Caffe
D. TensorFlow

(v) In the context of deep learning, what does "sparse coding" refer to?

A. Coding with minimal lines of code
B. Representing data using a few active components
C. Increasing the number of neurons in a layer
D. Removing unnecessary data points

Section – B खण्ड–ब

Short Answer Questions (लघुउत्तरीय प्रश्न)

2. Answer any five of the following questions in maximum 150 words. **5×7=35**

निम्नलिखित में से किन्हीं 5 प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें।

(i) Discuss various paradigms of learning problems in deep learning and their practical implications.

(ii) Explain the architecture of a multi-layer neural network and the role of each layer.

(iii) Differentiate between CNN & RNN with diagram.

(iv) Define back propagation and describe its steps in training a neural network.

(v) What is an activation function? Compare and contrast three different activation functions used in Neural

Networks.

(vi) What are Autoencoders? Discuss their uses in feature learning and data compression.

(vii) Describe the structure and functioning of a Hopfield Network.

Section – C खण्ड–स

Descriptive Questions (विवरणात्मकप्रश्न)

3. Answer any 02 question of the following question in maximum 500 words. **2×10=20**

निम्नलिखित में से किन्हीं 2 प्रश्न के उत्तर अधिकतम 500 शब्दों में दें।

(i) Describe the structure and training process of a Deep Belief Network (DBN). How does it use Restricted Boltzmann Machines (RBMs) to address optimization challenges in deep neural networks?

(ii) Discuss how unsupervised learning differs from semi-supervised learning in the context of deep learning. Provide an example where semi-supervised learning might be more advantageous than unsupervised learning.

(iii) How do Caffe, Theano, and Torch compare in terms of architecture, ease of use, and suitability for various types of deep learning research? Provide examples of specific tasks where one framework might be preferred over the others.

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